HEWLETT-PACKARD COMPANY
Legal Department, IPA Section, ms: 35
P O BOX 272400
3404 East Harmony Road
Fort Collins, CO 80528-9599

Amendments to the Claims

Applicant believes this listing of the claims and the status identifiers is correct and that Examiner's listing of claims 2-11, 14, 24, 36, 39-40, and 43-37 as withdrawn is incorrect and it should read that claims 5-11, 24, 36, and 45-47 are withdrawn. This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of claims:

1. (Currently amended) A dispensing apparatus, comprising:

a ceramic body having a chamber, said chamber including a first portion and an outlet portion, said ceramic body formed from titanium nitride and having at least one inlet channel fluidically coupled to said chamber; ~~and~~

at least one feed screw ~~having a helical thread~~ disposed in said chamber, said feedscrew having:

kneading threads formed in a portion of the feedscrew where said at least one inlet channel couples to said chanber;

left handed threads formed in a portion of the feedscrew proximate to said outlet portion,

a cylindrical section with no threads disposed between said kneading threads and said left handed threads,

a drive shaft socket formed coaxially in a drive coupling end of said feedscrew, said drive shaft socket configured to accept a cylindrical drive shaft having a flat face forming a D cross-sectional shape, wherein said drive shaft includes a flexible rotary coupling, and wherein said feed screw is formed of a titanium carbide and nickel cermet material, and

a ferro fluidic seal disposed between said feedscrew and said chamber, wherein rotating said at least one feed screw urges a viscoelastic fluid in said chamber toward said outlet portion.

2. (Original) The dispensing apparatus in accordance with claim 1, wherein said at least one inlet channel further comprises:

a first inlet channel delivering a first component viscoelastic fluid to said chamber; and

a second inlet channel delivering a second component viscoelastic fluid to said chamber, said first and said second inlet channels disposed hindering interaction between said first and said second component viscoelastic fluids in either inlet channel, wherein rotation of said at least one feed screw mixes said first and said second component viscoelastic fluids forming a viscoelastic fluid product and rotation of said at least one feed screw urges said viscoelastic fluid product to said outlet portion dispensing a pre-selected amount of said viscoelastic fluid product from said chamber.

3. (Original) The dispensing apparatus in accordance with claim 2, wherein said first and second inlet channels extend radially from said chamber where one inlet channel is closer to said first portion of said chamber than said second inlet channel and said first and second inlet channels are separated by at least a distance sufficient to preclude interaction, in either inlet channel, of said first and second component viscoelastic fluids.

4. (Original) The dispensing apparatus in accordance with claim 2, wherein said first inlet channel descends to said chamber and said second inlet channel ascends to said chamber, wherein said first and said second inlet channels attach to said chamber at a common location forming an acute angle between said first and said second inlet channels.

5. (Withdrawn) The dispensing apparatus of claim 2, wherein the at least one feed screw further comprises two feed screws having helical threads.

6. (Withdrawn) The dispensing apparatus of claim 5, wherein said chamber further comprises a middle portion disposed between said first portion and said outlet portion, said middle portion having a barrel body including two partly overlapping cylindrical bores, wherein each cylindrical bore having one of said two feed screws rotatably disposed therein.

7. (Withdrawn) The dispensing apparatus of claim 6, wherein each of said two partly overlapping cylindrical bores further comprises an internal wall substantially

parallel to the other, wherein said helical threads of said two feed screws in sliding contact with said internal wall of said bore in which said feed screw is disposed, and wherein said helical threads of said two feed screws are intermeshing in a region of overlap of said two partly overlapping cylindrical bores.

8. (Withdrawn) The dispensing apparatus of claim 5, wherein said two feed screws further comprise helical threads having a variable pitch that decreases as said helical threads approach said outlet portion of said chamber.

9. (Withdrawn) The dispensing apparatus of claim 5, wherein said chamber further comprises a middle portion having a barrel body including two non-overlapping cylindrical bores wherein each cylindrical bore having one of said two feed screws rotatably supported therein.

10. (Withdrawn) The dispensing apparatus of claim 9, wherein each of said two non-overlapping cylindrical bores further comprise an internal wall substantially parallel to the other, wherein said helical threads of said two feed screws in sliding contact with said internal wall of said bore in which said feed screw is disposed, and wherein said helical threads of said two feed screws are non-intermeshing.

11. (Withdrawn) The dispensing apparatus of claim 1, wherein the chamber further comprises a middle portion disposed between said first portion and said outlet portion, said middle portion having smoothly varying tapered internal walls, said middle portion having a first diameter near said first portion and a second diameter near said second portion, wherein said first diameter is greater than said second diameter; and wherein said helical threads of said at least one feed screw are in sliding contact with said tapered internal walls of said middle portion of said chamber.

12. (Original) The dispensing apparatus of claim 1, wherein said at least one feed screw further comprises helical threads having a linear pitch.

13. (Original) The dispensing apparatus of claim 1, wherein said chamber further comprises a side wall, wherein said chamber is cylindrical in shape having an axis extending centrally and longitudinally through said ceramic body and said side wall forms a substantially cylindrical internal volume.

14. (Original) The dispensing apparatus of claim 13, wherein said at least one inlet channel further comprises:

a first inlet channel extending radially from said chamber delivering a first component viscoelastic fluid to said chamber; and

a second inlet channel extending radially from said chamber delivering a second component viscoelastic fluid to said chamber, said first and second inlet channels separated in a direction along said axis of said chamber precluding interaction of said first and second component fluids in either inlet channel, wherein rotation of said at least one feed screw mixes said first and said second component viscoelastic fluids forming a viscoelastic fluid product and rotation of said at least one feed screw urges said viscoelastic fluid product to said outlet portion.

15. (Original) The dispensing apparatus of claim 1, wherein said chamber further comprises a third portion having an internal wall with a cylindrical shape forming a substantially cylindrical internal volume, wherein said helical threads of said at least one feed screw are in sliding contact with said internal wall of said third portion of said chamber.

16. (Original) The dispensing apparatus of claim 1, wherein said ceramic body is disposed within an internal cavity of a housing.

17. (Original) The dispensing apparatus of claim 16, where in said ceramic body is formed as a removable ceramic insert.

18. (Original) The dispensing apparatus of claim 16, further comprising at least one heater element disposed within said internal cavity of said housing.

19. (Original) The dispensing apparatus of claim 18, wherein said heater element is an infrared heating element.

20. (Original) The dispensing apparatus of claim 18, further comprising a temperature controller electrically coupled to said at least one heater element, wherein said temperature controller maintains said ceramic body at a preselected temperature.

21. (Original) The dispensing apparatus of claim 20, wherein said pre-selected temperature is in the range from about 30 °C to about 150 °C.

22. (Original) The dispensing apparatus in accordance with claim 16, wherein said housing further comprises a main body, having a first portion of said internal cavity formed therein.

23. (Original) The dispensing apparatus in accordance with claim 22, wherein said housing further comprises:

a front body having a second portion of said internal cavity formed therein; and

a locking mechanism releasably securing said main body to said front body.

24. (Withdrawn) The dispensing apparatus in accordance with claim 23, wherein said housing further comprises a hinge mechanism, hingedly coupling said main body to said front body.

25. (Original) The dispensing apparatus of claim 1, further comprising at least one heater element thermally coupled to said ceramic body.

26. (Original) The dispensing apparatus of claim 1, further comprising at least one heater element formed on at least a portion of an outer surface of said chamber.

27. (Original) The dispensing apparatus of claim 26, wherein said at least one heater element further comprises a thick film heating element.

28. (Original) The dispensing apparatus of claim 26, wherein said at least one heater element further comprises a thin film heating element.

29. (Original) The dispensing apparatus of claim 28, further comprising a temperature controller electrically coupled to said at least one heater element, wherein said temperature controller maintains said ceramic body at a pre-selected temperature.

30. (Original) The dispensing apparatus of claim 29, wherein said pre-selected temperature is in the range from about 30 °C to about 200 °C.

31. (Original) The dispensing apparatus of claim 1, wherein said ceramic body further comprises a heater cavity formed in said ceramic body, said heater cavity adapted to accept a heater rod.

32. (Original) The dispensing apparatus of claim 1, further comprising at least one heater element thermally coupled to said at least one feed screw.

33. (Original) The dispensing apparatus of claim 1, wherein said at least one feed screw further comprises a heater element formed therein.

34. (Original) The dispensing apparatus of claim 1, wherein said at least one feed screw is formed utilizing a ceramic material.

35. (Original) The dispensing apparatus of claim 1, wherein said at least one feed screw is formed utilizing a cermet material.

36. (Withdrawn) The dispensing apparatus of claim 1, wherein said at least one feed screw further comprises a helical thread having a decreasing variable pitch moving from near said first portion towards said outlet portion.

37. (Original) The dispensing apparatus of claim 1, wherein rotation of said at least one feed screw dispenses a pre-selected amount of said viscoelastic fluid from said chamber.

38. (Currently amended) A dispensing apparatus, comprising:

a ceramic body formed from titanium nitride and having a chamber;

means for introducing a viscoelastic material to said chamber; and

means for urging said viscoelastic material to an outlet portion of said chamber, said means for urging having:

kneading threads formed in a portion of the feedscrew where said at least one inlet channel couples to said chanber;

left handed threads formed in a portion of the feedscrew proximate to said outlet portion,

a cylindrical section with no threads disposed between said kneading threads and said left handed threads,

a drive shaft socket formed coaxially in a drive coupling end of said feedscrew, said drive shaft socket configured to accept a cylindrical drive shaft having a flat face forming a D cross-sectional shape, wherein said drive shaft includes a flexible rotary coupling, and wherein said feed screw is formed of a titanium carbide and nickel cermet material, and

a ferro fluidic seal disposed between said means for urging and said chamber, wherein ~~rotating said at least one feed screw~~ rotation of said means for urging urges a viscoelastic fluid in said chamber toward ~~said~~ an outlet portion formed in said ceramic body.

39. (Original) The dispensing apparatus of claim 38, wherein said means for introducing further comprises:

means for delivering a first component viscoelastic material to said chamber; and

means for delivering a second component viscoelastic material to said chamber.

40. (Original) The dispensing apparatus of claim 39, further comprising means for mixing said first and said second component viscoelastic materials.

41. (Original) The dispensing apparatus of claim 38, further comprising means for heating said viscoelastic material in said chamber.

42. (Currently amended) A method of operating a dispensing apparatus, comprising:

introducing a viscoelastic fluid to a chamber formed in a titanium nirtride ceramic body;

rotating at least one feed screw disposed in said chamber a pre-selected amount, said at least one feedscrew having:

kneading threads formed in a portion of the feedscrew where said at least one inlet channel couples to said chanber;

left handed threads formed in a portion of the feedscrew proximate to said outlet portion,

a cylindrical section with no threads disposed between said kneading threads and said left handed threads,

a drive shaft socket formed coaxially in a drive coupling end of said feedscrew, said drive shaft socket configured to accept a cylindrical drive shaft having a flat face forming a D cross-sectional shape, wherein said drive shaft includes a flexible rotary coupling, and wherein said feed screw is formed of a titanium carbide and nickel cermet material, and

a ferro fluidic seal disposed between said feedscrew and said chamber;

urging said viscoelastic fluid to an outlet portion of said chamber; and

dispensing a pre-selected quantity of said viscoelastic fluid from the dispensing apparatus.

43. (Original) The method of claim 42, wherein introducing said viscoelastic fluid further comprises:

introducing a first component viscoelastic fluid to said chamber through a first inlet; and

introducing a second component viscoelastic fluid to said chamber through a second inlet.

44. (Original) The method of claim 43, further comprising:

mixing said first component and said second component viscoelastic fluids;

forming a viscoelastic fluid product; and

dispensing a pre-selected quantity of said viscoelastic fluid product from the dispensing apparatus.

45. (Withdrawn) The method of claim 42, wherein introducing said viscoelastic fluid further comprises:

introducing a first component viscoelastic fluid, through a first inlet, to a first feed screw disposed within said chamber; and

introducing a second component viscoelastic through a second inlet, to a second feed screw disposed within said chamber.

46. (Withdrawn) The method of claim 45, further comprising:

counter-rotating said first and said second feed screws a pre-selected amount;

mixing said first and said second component viscoelastic fluids; and

forming a viscoelastic liquid product.

47. (Withdrawn) The method of claim 45, further comprising:

co-rotating said first and said second feed screws a pre-selected amount;

mixing said first and said second component viscoelastic fluids; and

forming a viscoelastic liquid product.

48. (Original) The method of claim 42, further comprising heating said viscoelastic fluid in said chamber.

49. (Original) The method of claim 48, further comprising controlling the viscosity of said viscoelastic fluid in said chamber.

50. (Original) The method of claim 48, wherein heating said viscoelastic fluid further comprises heating said viscoelastic fluid in the temperature range from about 30 degrees centigrade to about 200 degrees centigrade.

51. (Original) The method of claim 42, further comprising cleaning said chamber of said ceramic body.

52. (Original) The method of claim 51, further comprising cleaning said at least one feed screw.

53. (Original) The method of claim 52, wherein cleaning said at least one feed screw further comprises exposing said at least one feed screw to a reactive plasma treatment.

54. (Original) The method of claim 51, wherein cleaning said chamber further comprises heating said chamber to above 300 °C.

55. (Original) The method of claim 51, wherein cleaning said chamber further comprises heating said chamber to above 450 °C.

56. (Original) The method of claim 51, wherein cleaning said chamber further comprises exposing said chamber to a reactive plasma treatment.

57. (Original) The method of claim 56, further comprising heating said chamber.

58. (Original) The method of claim 51, further comprising:
de-mounting said ceramic body from a mounting support; and
removing said at least one feed screw from said chamber of said ceramic body.

59. (Original) The method of claim 51, further comprising removing said ceramic body from a housing.